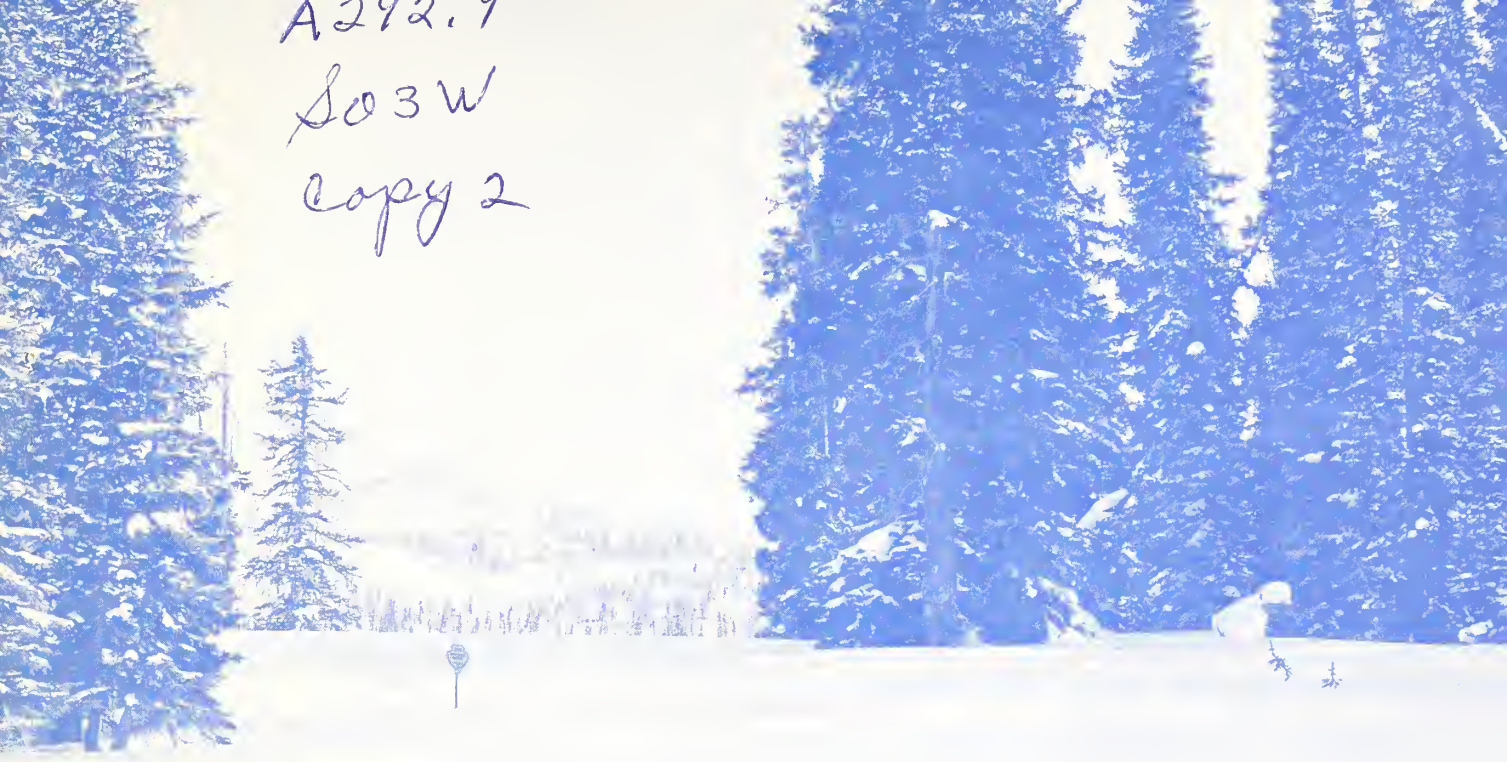


WATER SUPPLY OUTLOOK FOR WESTERN UNITED STATES

Including Columbia River Drainage in Canada

and

FEDERAL - STATE - PRIVATE COOPERATIVE SNOW SURVEYS

UNITED STATES DEPARTMENT of AGRICULTURE···SOIL CONSERVATION SERVICE
Collaborating with
CALIFORNIA DEPARTMENT of WATER RESOURCES
and
BRITISH COLUMBIA DEPARTMENT of
LANDS, FORESTS and WATER RESOURCES

AS OF
MAY 1, 1968

TO RECIPIENTS OF WATER SUPPLY OUTLOOK REPORTS:

Most of the usable water in western states originates as mountain snowfall. This snowfall accumulates during the winter and spring, several months before the snow melts and appears as streamflow. Since the runoff from precipitation as snow is delayed, estimates of snowmelt runoff can be made well in advance of its occurrence. Streamflow forecasts published in this report are based principally on measurement of the water equivalent of the mountain snowpack.

Forecasts become more accurate as more of the data affecting runoff are measured. All forecasts assume that climatic factors during the remainder of the snow accumulation and melt season as they affect runoff will add to be an effective average. Early season forecasts are therefore subject to a greater change than those made on later dates.

The snow course measurement is obtained by sampling snow depth and water equivalent at surveyed and marked locations in mountain areas. A total of about ten samples are taken at each location. The average of these are reported as snow depth and water equivalent. These measurements are repeated in the same location near the same dates each year.

Snow surveys are made monthly or semi-monthly from January 1 through June 1 in most states. There are about 1400 snow courses in Western United States and in the Columbia Basin in British Columbia. In the near future, it is anticipated that automatic snow water equivalent sensing devices along with radio telemetry will provide a continuous record of snow water equivalent at key locations.

Detailed data on snow course and soil moisture measurements are presented in state and local reports. Other data or reservoir storage, summaries of precipitation, current streamflow, and soil moisture conditions at valley elevations are also included. The report for Western United States presents a broad picture of water supply outlook conditions, including selected streamflow forecasts, summary of snow accumulation to date, and storage in larger reservoirs.

Snow survey and soil moisture data for the period of record are published by the Soil Conservation Service by states about every five years. Data for the current year is summarized in a West-wide basic data summary and published about October 1 of each year.

PUBLISHED BY SOIL CONSERVATION SERVICE

D. A. WILLIAMS, Administrator

The Soil Conservation Service publishes reports following the principal snow survey dates from January 1 through June 1 in cooperation with state water administrators, agricultural experiment stations and others. Copies of the reports for Western United States and all state reports may be obtained from Soil Conservation Service, Western Regional Technical Service Center, Room 507, 701 N. W. Glisan, Portland, Oregon 97209.

Copies of state and local reports may also be obtained from state offices of the Soil Conservation Service in the following states:

STATE	ADDRESS
Alaska	P. O. Box "F", Palmer, Alaska 99645
Arizona	6029 Federal Building, Phoenix, Arizona 85205
Colorado (N. Mex.)	12417 Federal Building, Denver, Colorado 80202
Idaho	P. O. Box 38, Boise, Idaho 83707
Montana	P. O. Box 98, Bozeman, Montana 59715
Nevada	P. O. Box 4850, Reno Nevada 89505
Oregon	1218 S. W. Washington St., Portland, Oregon 97205
Utah	4012 Federal Building, Salt Lake City, Utah 84111
Washington	360 Federal Office Building, Spokane, Washington 99201
Wyoming	P. O. Box 340, Casper, Wyoming 82602

PUBLISHED BY OTHER AGENCIES

Water Supply Outlook reports prepared by other agencies include a report for California by the Water Supply Forecast and Snow Surveys Unit, California Department of Water Resources, P. O. Box 388, Sacramento, California 95802 --- and for British Columbia by the Department of Lands, Forests and Water Resources, Water Resources Service, Parliament Building, Victoria, British Columbia

USDA-SCS-PORTLAND, OREG. 1966

WATER SUPPLY OUTLOOK FOR WESTERN UNITED STATES

Including Columbia River Drainage in Canada

ISSUED

MAY 1, 1968

The Soil Conservation Service coordinates snow surveys conducted by its staff and many cooperators, including the Bureau of Reclamation., Corps of Engineers, Forest Service, National Park Service, Weather Bureau, Geological Survey, and other Federal Agencies, Departments of State Government, Irrigation Districts, Power Companies, and others.

The Department of Water Resources coordinates snow surveys in California.

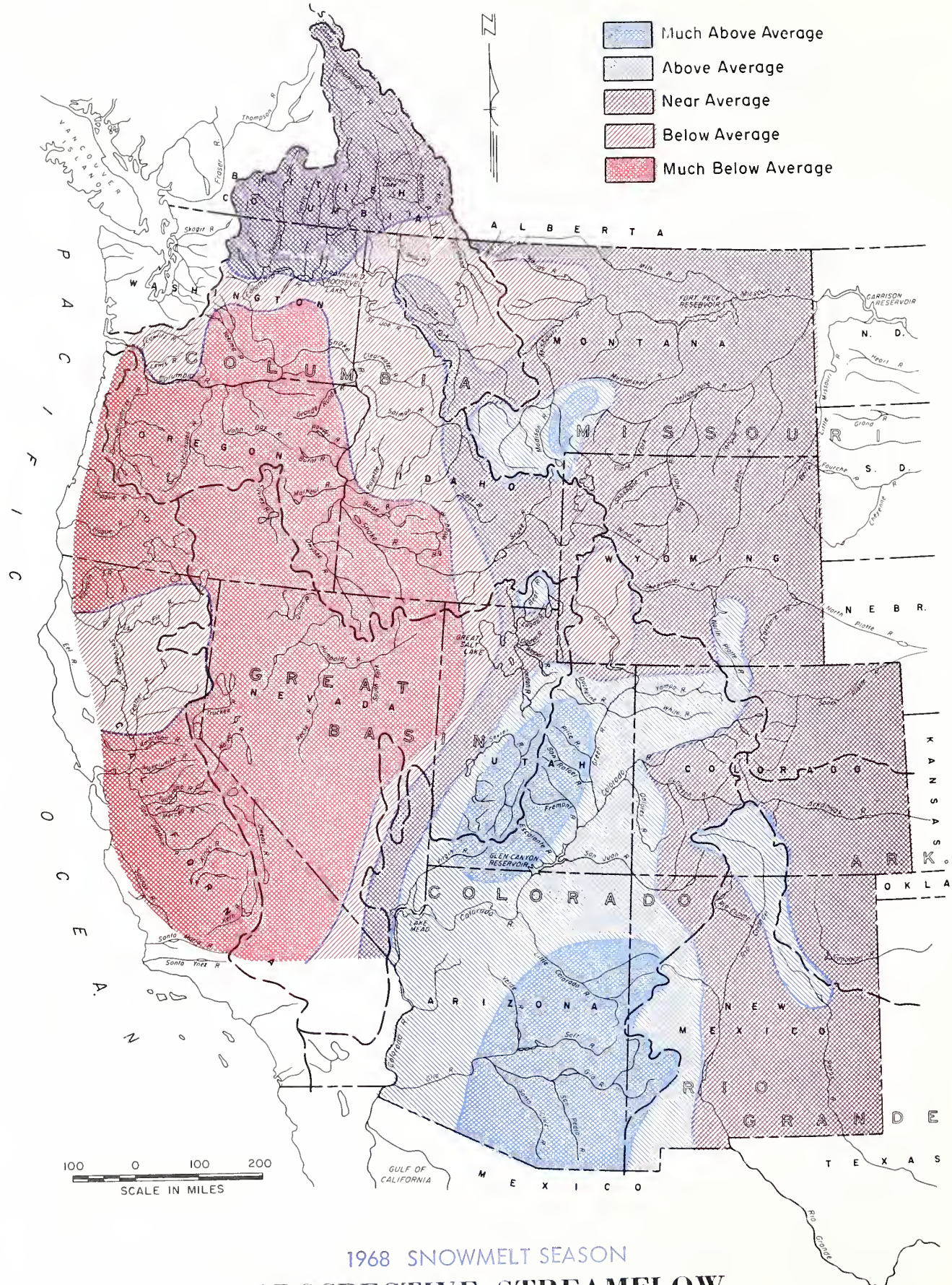
The Water Resources Service, Department of Lands, Forests, and Water Resources directs snow surveys in British Columbia.

This report was prepared by the Water Supply Forecasting Branch, Engineering Division, Soil Conservation Service, from data supplied by Snow Survey Supervisors of the Soil Conservation Service in the States of Alaska, Arizona, Colorado and New Mexico, Idaho, Montana, Nevada, Oregon, Utah, Washington, and Wyoming.

Data from California was supplied by the Chief, Water Supply Forecast and Snow Survey Unit, Department of Water Resources.

Data from British Columbia was supplied by the Chief, Hydrology Division, Water Investigations Branch, Department of Lands, Forests and Water Resources.

U. S. DEPARTMENT OF AGRICULTURE
SOIL CONSERVATION SERVICE
D. A. WILLIAMS, ADMINISTRATOR



1968 SNOWMELT SEASON

PROSPECTIVE STREAMFLOW

AS OF MAY 1, 1968

WATER SUPPLY OUTLOOK

1968 SNOWMELT SEASON
AS OF MAY 1, 1968

IRRIGATION WATER SUPPLY REMAINS SATISFACTORY FOR MOST WESTERN AREAS IN 1968. LIMITED TO SEVERE SHORTAGES EXPECTED IN OREGON, NEVADA AND SOUTHWESTERN IDAHO. STREAMFLOW OUTLOOK WORSENS IN WEST COAST STATES AND IMPROVES IN ROCKY MOUNTAIN STATES.

Variation in snowmelt season streamflow prospects throughout the west is extensive. Oregon, California and Nevada will have below to much below average streamflow. To the east streamflow forecasts rapidly improve with flows in the average to above average range in prospect for most areas in the Rocky Mountain states. Much above average flows are predicted in the Central Valley of Arizona, in south-central Utah and two smaller areas, one on the Gallatin in Montana and the other on a small North Platte tributary east of Casper, Wyoming. Near normal streamflow will occur in the British Columbia portions of the Columbia river basin. Average or better flows are forecast for most Colorado, Missouri, Rio Grande and Arkansas streams, both main stem and tributary.

Carryover storage from the above average 1967 streamflow in many western states will help offset prospective shortages of natural streamflow on many streams in 1968. This is particularly true in California and western Nevada where snowmelt runoff will be below average yet total water supply will be generally adequate due to reservoir stored water. The same also applies on streams such as the Yakima in Washington, Snake, Boise and Payette in Idaho and Owyhee in Oregon.

Central Arizona's water supply outlook is excellent. Reservoirs in the Salt River Project are full. The high elevation snowpack is good. This will be the third year of above average streamflow. Substantial quantities of water will be carried over into 1969.

Above average snowfall and cool temperatures occurred during April in the Colorado River basin. Inflow to Lake Powell is now projected to be 105 percent of average. Snowmelt runoff for the rest of the irrigation season for Colorado River tributary streams has likewise improved by 10 to 20 percent and is now in the 94 to 144 percent of average range. Reservoir storage is slightly better than last year and about 50 percent of capacity.

Generally, average streamflow is in prospect on most upper Missouri streams. Forecasts range from 80 to 139 percent of average with the lesser flows occurring on the Sun, Teton, Milk and Marias rivers. No material shortages are expected. Wyoming's Powell basin water supply will be satisfactory. The flow of the North Platte will be moderately above average. Outlook improved moderately on the South Platte tributaries and average runoff is anticipated. Normal summer demands will be adequately met by streamflow and stored water. The May 1 snowpack on the Rio Grande headwater tributaries is much above average. Slightly above average streamflow amounts in the 103 to 118 percent range are anticipated on the Rio Grande in Colorado and New Mexico.

The California Department of Water Resources reports that even with above normal precipitation during the remainder of the year, streamflow will be substantially below normal this summer throughout the State. Predominately sunny weather during April resulted in the rapid depletion of California's below normal snowpack accumulation which, as of May 1, was 45 percent of normal. Reservoir storage is normal or above in all areas of the State and ground water levels are generally good. Although there will be isolated shortages this season, no critical water shortages are anticipated.

Great Basin streamflow and water supply outlook varies from good to excellent in Utah to

SUMMARY OF SNOW WATER EQUIVALENT MEASUREMENTS MAY 1, 1968

MAJOR BASIN AND SUB—WATERSHED	WATER EQUIVALENT IN PERCENT OF: LAST YEAR	AVERAGE
MISSOURI BASIN		
Jefferson	67	108
Madison	72	127
Gallatin	102	144
Missouri Main Stem	69	120
Yellowstone	82	123
Shoshone	67	87
Wind	85	100
North Platte	101	118
South Platte	120	102
ARKANSAS BASIN		
Arkansas	177	132
Canadian		
RIO GRANDE BASIN		
Rio Grande (Colo.)	157	135
Rio Grande abv. Otowi Bridge	164	135
Pecos		
COLORADO BASIN		
Green (Wyo.)	69	97
Yampa - White	145	128
Duchesne	138	126
Price	179	185
Upper Colorado	138	117
Gunnison	186	133
San Juan	179	118
Dolores	561	180
Virgin	87	168
Gila		
Salt		
GREAT BASIN		
Bear	92	128
Logan	74	109
Ogden	81	166
Weber	111	178
Provo - Utah Lake	125	183
Jordan	112	166
Sevier	163	188
Walker - Carson	67	64
Tahoe - Truckee	22	38
Humboldt	0	0
Lake Co. (Oregon)	0	0
Harney Basin (Oregon)	0	0
UPPER COLUMBIA BASIN		
Columbia (Canada)	79	121
Kootenai	62	96
Clark Fork	67	92
Bitterroot	72	90
Flathead	65	92
Spokane	73	65
Okanogan	75	105
Methow	68	93
Chelan	88	95
Wenatchee	41	58

MAJOR BASIN AND SUB—WATERSHED	WATER EQUIVALENT IN PERCENT OF: LAST YEAR	AVERAGE
SNAKE BASIN		
Snake above Jackson, Wyo.	74	97
Snake above Hiese, Idaho	77	102
Snake abv. American Falls Res.	69	98
Henry's Fork	44	110
Southern Idaho Tributaries	63	81
Big and Little Wood	47	74
Boise	51	60
Owyhee	0	0
Payette	56	70
Malheur	0	0
Weiser	43	54
Burnt	21	49
Powder	22	47
Salmon	66	83
Grande Ronde	16	30
Clearwater	74	81
LOWER COLUMBIA BASIN		
Yakima	33	43
Umatilla	6	8
John Day	4	13
Deschutes	47	43
Crooked	0	0
Willamette	50	42
Lewis	45	57
Cowlitz	49	45
PACIFIC COASTAL BASIN		
Puget Sound	67	74
Olympic Peninsula	52	69
Umpqua - Rogue	30	46
Klamath	21	37
Trinity	29	60
CALIFORNIA CENTRAL VALLEY		
Upper Sacramento	33	60
Feather	22	50
Yuba	28	60
American	18	40
Mokelumne	17	40
Stanislaus	16	35
Tuolumne	13	30
Merced	14	30
San Joaquin	12	30
Kings	18	40
Kaweah	18	40
Tule	25	40
Kern	20	50

Data for California Watersheds supplied by Dept. of Water Resources, and for British Columbia Watersheds by Dept. of Lands, Forests and Water Resources.

Average is for 1948-62 period. California averages are for 1931-60.
Based on Selected Snow Courses determined by Distribution within the Basin, Length of Record and Repetitive Monthly Measurement Schedules.

very poor on the Humboldt in northeastern Nevada and fair to good along the east slope of the Sierras in western Nevada. In the below average areas reservoir storage will help offset deficiencies. On small streams, particularly those in Nevada without reservoir storage, earlier than usual late season shortages are anticipated.

Total snowpack and prospective runoff in the Columbia River basin is much less than last year. Near average streamflow is expected on the Columbia, Kootenai and Okanogan rivers in British Columbia and the upper Snake in Idaho and Wyoming. Much below average streamflow will occur in the lower Columbia particularly on tributaries in Oregon and in southeastern Idaho. The Columbia at The Dalles is forecast to flow 85 percent of its 1948-62 average.

ARKANSAS BASIN

Water supply prospects improved on the main stem Arkansas in Colorado during April due to above normal snowfall. April streamflow was extremely low due to the cold weather associated with the April storms. The Arkansas at Salida is now forecast to flow 90 percent of average which is an increase of 13 percent over that issued a month ago. Reservoir storage is poor.

The Canadian in New Mexico should yield an average flow. Reservoir storage will meet minimum needs. The amount and timing of spri and summer rainfall will determine whether there is any excess water.

MISSOURI BASIN

The water supply outlook on the upper Missouri and its tributaries is good with streams forecast to produce flows in the 80 to 139 percent of average range.. Most will yield near average amounts. Reservoir storage in Montana and the Dakotas is above average and greater than last year. Snow cover is above average on the Madison, Gallatin, Yellowstone and Missouri tributaries near Helena; near average on the Jefferson and below average on the Sun-Marias-Teton drainages.

In Wyoming near average flows are anticipated on the Shoshone and Wind rivers. Water supplies in the Powell basin will be satisfactory.

April precipitation in the North Platte was above normal. A 117 percent of average flow is forecast for the North Platte at Saratoga. An extremely heavy flow (195 percent of average) is anticipated for Deer Creek at Glen Rock, Wyoming. North Platte reservoir storage will adequately meet irrigation water demands. Seminoe Reservoir now holds 245,000 acre-feet compared to its capacity of 982,000 acre-feet. The Laramie is forecast to flow 104 percent of average during April-September, essentially the same as predicted on April 1.

April snowfall was above average over the South Platte in Colorado. Forecasts on South Platte tributaries have been raised about 5 to 10 percent and are now in the 100 to 104 percent range. Reservoir storage in the Colorado-Big Thompson and other smaller irrigation reservoirs is near average. Municipal water supply is good. The total water supply will be adequate for normal demands.

RIO GRANDE BASIN

Irrigation streamflow prospects on the Rio Grande in Colorado and New Mexico remain slightly above average in the 103 to 118 percent of average range. Additional April snowfall and cool temperatures have improved the snowpack on the headwater tributaries to the Rio Grande to a much above normal condition. Streamflow should be adequate on most small ungaged streams. However, late season flows may be short. Reservoir storage in New Mexico is below average and capacity; but comparable to recent years. As usual, total surface water supplies will be less than demands. The Pecos River should have an adequate water supply.

COLORADO BASIN

May 1 snowpack in the upper Colorado basin is average to above average ranging from 97 percent on the Green river in Wyoming to 180 percent on the Dolores river in Colorado and 185 percent on the Price river in Utah. Due to above normal April snowfall and little melt, most irrigation streamflow forecasts have been revised upward by 10 to 20 percent and now range from 93 to 144 percent of average. The poorest outlook is on the upper Green river with 72 percent average inflow predicted at Flaming Gorge Reservoir. Well above average flows from Utah and Colorado tributaries into the Green river below Flaming Gorge will result in near normal runoff for

SELECTED STREAMFLOW FORECASTS MAY-SEPTEMBER 1968 as of MAY 1, 1968

STREAM AND STATION	1000 ACRE-FEET		PERCENT OF AVERAGE
	FLOW	FORECAST	
UPPER MISSOURI	1967	1968	
Jefferson at Sappington, Montana	1222	958	116
Madison near Grayling, Montana 1/	544	405	111
Gallatin near Gateway, Montana	553	580	139
Missouri near Zortman, Montana 2/	6162	4260	109
Sun at Gibson Dam, Montana 3/	731	460	80
Marias near Shelby, Montana 4/	757	432	77
Milk near Eastern Crossing, Montana	281	190	92
Yellowstone at Livingston, Montana		2100	104
Shields at Clyde Park, Montana	128	110	134
Clark Fork at Chance, Montana	771	600	107
Shoshone, Inflow to Buffalo Bill Res., Wyo. *		823	103
Wind at Dubois, Wyoming*		95	95
Bull Lake near Lenore, Wyoming*		150	85
Tensleep near Tensleep, Wyoming*		66	92
Yellowstone at Miles City, Montana 5/	8697	5600	106
Missouri near Williston, N. Dakota 6/		9800	105
PLATTE			
North Platte at Saratoga, Wyoming *		750	117
Laramie near Jelm, Wyoming 7/ *		124	111
Clear at Golden, Colorado*		140	104
St. Vrain at Lyons, Colorado *		82	103
Cache LaPoudre near Fort Collins, Colorado 8/ *		183	100
ARKANSAS			
Arkansas at Salida, Colorado 9/*		310	90
Purgatoire at Trinidad, Colorado *		55	122
RIO GRANDE			
Rio Grande near Del Norte, Colorado 10/*		570	116
Conejos near Mogote, Colorado 11/ *		200	102
Rio Chama near LaPuente, New Mexico *		220	103
Rio Grande at Otowi Bridge, New Mexico 12/(Mar-July)		640	105
Pecos at Pecos, New Mexico **		65	122
UPPER COLORADO			
Colorado near Granby, Colorado 13/ *		250	107
Colorado near Glenwood Springs, Colorado 14/ *		1660	102
Roaring Fork at Glenwood Springs, Colorado 15/ *		850	112
Gunnison at Grand Junction, Colorado *		1340	103
Dolores at Dolores, Colorado *		330	127
Colorado near Cisco, Utah	2050	4050	123
Green inflow to Flaming Gorge Res., Utah 16/**	1516	815	72
Yampa at Steamboat Springs, Colorado *		320	110
White at Meeker, Colorado *		370	111
Duchesne near Tabiona, Utah 17/	140	123	118
Rock Creek near Mountain Home, Utah	131	112	114
Price near Scofield, Utah 18/	39	46	144
Green at Green River, Utah 16/	3170	2700	93
San Juan inflow to Navajo Res., N. M. **		750	108
Animas at Durango, Colorado *		540	118
San Juan near Bluff, Utah 19/	706	1230	128
Colorado, Inflow to Lake Powell, Arizona 20/**	6045	8100	105
LOWER COLORADO			
Gila near Solomon, Arizona (Apr-May)	8	104	267
Salt at Intake, Arizona (Apr-May)	29	305	212
Verde above Horseshoe Dam, Arizona (Apr-May)	26	40	83

SELECTED STREAMFLOW FORECASTS MAY - SEPTEMBER 1968 as of MAY 1, 1968

STREAM AND STATION	1000 ACRE-FEET		PERCENT OF AVERAGE
	FLOW	FORECAST	
GREAT BASIN	1967	1968	
Bear at Harer, Idaho	299	265	131
Logan near Logan, Utah 21/	141	100	85
Ogden, Inflow to Pine View Res., Utah 22/ (May-July)	108	69	96
Weber near Oakley, Utah	161	129	114
Inflow to Utah Lake, Utah	286	260	127
Big Cottonwood near Salt Lake City, Utah	42	42	120
Beaver near Beaver, Utah	29	30	135
South Fork Humboldt near Elko, Nevada (May-July)	67	28	57
Humboldt at Palisades, Nevada (May-July)	175	35	28
Truckee at Farad, California 25/ (May-July)	510	120	63
East Carson near Gardnerville, Nevada (May-July)	291	83	58
West Walker near Coleville, California (May-July)	229	75	61
UPPER COLUMBIA			
Columbia at Revelstoke, British Columbia	24310	21200	109
Kootenai at Wardner, British Columbia	5403	4350	94
Kootenai at Leonia, Idaho	9606	6700	80
Flathead near Columbia Falls, Montana 26/	6704	4850	83
Flathead near Polson, Montana 26/	7721	5570	80
Clark Fork above Missoula, Montana	1935	1580	99
Bitterroot near Darby, Montana	551	490	95
Clark Fork at Whitehorse Rapids, Montana 26/		10220	81
Columbia at Birchbank, British Columbia 26/	49840	41700	98
Spokane at Post Falls, Idaho 27/		1550	69
Columbia at Grand Coulee, Washington 26/	69380	58300	92
Okanogan near Tonasket, Washington		1660	92
Chelan at Chelan, Washington 28/		1180	97
Wenatchee at Peshastin, Washington		1360	80
SNAKE			
Snake above Palisades Res., Wyoming 29/ *		2260	87
Snake near Heise, Idaho 29/	3888	3200	92
Henry's Fork near Rexburg, Idaho 30/	1345	1000	90
Big Lost near Mackay, Idaho 31/	282	125	88
Big Wood, Inflow to Magic Res., Idaho 32/(May-July)	318	80	49
Bruneau near Hot Springs, Idaho	157	82	55
Owyhee Res., Net Inflow, Oregon	277	32	17
Boise near Boise, Idaho 33/		740	59
Malheur near Drewsey, Oregon	47	5	14
Payette near Horseshoe Bend, Idaho 34/	1620	1100	69
Snake at Weiser, Idaho		3100	58
Salmon at Whitebird, Idaho	7064	5200	84
Clearwater at Spalding, Idaho	7084	5800	80
LOWER COLUMBIA			
Grande Ronde at LaGrande, Oregon	119	29	24
Yakima at Cle Elum, Washington 35/	792	480	56
Deschutes at Benham Falls, Oregon 36/		260	48
Columbia at The Dalles, Oregon 26/	100620	80600	85
Hood near Hood River, Oregon 36/		140	50
Willamette at Salem, Oregon 36/*		2900	52
Lewis at Ariel, Washington 37/		810	79
Cowlitz at Castle Rock, Washington		1720	77

SELECTED STREAMFLOW FORECASTS MAY - SEPTEMBER 1968 as of MAY 1, 1968

STREAM AND STATION	1000 ACRE-FEET		PERCENT OF AVERAGE
	FLOW	FORECAST	
	1967	1968	
NORTH PACIFIC COASTAL			
Dungeness near Sequim, Washington		118	75
Rogue at Raygold, Oregon	703	385	53
Klamath Lake, Net Inflow, Oregon	429	235	54
CALIFORNIA CENTRAL VALLEY 38/**			
Sacramento, Inflow to Shasta, California	2760	1350	77
Feather near Oroville, California	3042	1220	66
Yuba at Smartville, California	1734	750	69
American, Inflow to Folsom Res., Calif.	2302	730	55
Cosumnes at Michigan Bar, California	333	60	47
Mokelumne, Inflow to Pardee Res., Calif.	831	230	50
Stanislaus, Inflow to Melones Res., Calif.	1340	370	52
Tuolumne, Inflow to Don Pedro Res., Calif.	2175	640	54
Merced, Inflow to Excheque Res., Calif.	1232	300	50
San Joaquin, Inflow to Millerton Lake, Calif.	2327	570	49
Kings, Inflow to Pine Flat Res., California	2227	550	48
Kaweah, Inflow to Terminus Res., California	609	110	42
Tule, Inflow to Success Res., California	164	26	46
Kern, near Bakersfield, California	924	260	62

Forecasts in California provided by Department of Water Resources.
Average is for 1948-62 period except California. California is computed for 1916-65 period.
Forecasts assume average Effective Climate Conditions from Date Through Snow Melt Season.

Explanatory Notes on Forecasts listed on Inside Back Cover.
** April - Sept Period* *** April - July Period*

the lower Green river. The San Juan and Dolores will yield flows in the 125-130 percent range. Inflow to Lake Powell is forecast at 105 percent of average for the April-July period, an increase of 15 percent over that of a month ago.

In general, storage in Lake Mead and upper Colorado river storage project reservoirs is slightly better than a year ago but less than half of capacity. The outlook with near average 1968 spring and summer streamflow would indicate similar reservoir contents a year from now.

Water supply prospects in the lower Columbia river drainage remain excellent. Salt River Project reservoirs are within 2 percent of capacity; the most water ever held in storage on this date. San Carlos reservoir contains 670,000 acre-feet (56 percent of capacity) which is the most water held in storage since the established record amount of 800,000 acre-feet in 1942. Much snow remains at the higher elevations. Below 9,600 feet most snow has melted. Below normal April precipitation has resulted in a slight reduction in forecasts on most streams. Carryover storage in 1969 from this year's streamflow will be substantial.

GREAT BASIN

Cold and wet April weather has resulted in significant increases in streamflow prospects in the Great Basin section of Utah. The water outlook is now excellent except for limited areas in Cache, Rich and northern Morgan counties where smaller streams are expected to yield about 70-85 percent of average flows. Some late season water shortages could develop in this northern Utah area.

April snowmelt runoff was below average. However, total reservoired water supplies remain good to excellent at 117 percent of average for major Utah irrigation reservoirs as a group and 103 percent for the three principal reservoirs in the Sevier basin. Heaviest runoff is anticipated in the vicinity of Piute Reservoir, Richfield and Fillmore (over 150 percent of average). Other streams in central and southern Utah are forecast to flow over 130 percent of average; one of the best seasons in the past ten years.

Nevada's 1968 water supply outlook varies from very poor on the Humboldt river to near average on the Tahoe-Truckee basins and above

average on the Virgin river. April was a dry month and most streams had below average April flows. Reservoir storage is still well above average along the east slope of the Sierras but well below average on the Humboldt. Water users on smaller streams without supplemental stored water will experience water shortages much earlier than usual.

COLUMBIA BASIN

Water supply outlook in the Columbia basin ranges from near average in British Columbia and the upper Snake in Idaho and Wyoming to much below average in Oregon and on southern tributaries to the Snake in Idaho. Both the total snowpack and prospective streamflow are much less than occurred in 1967. Oregon has an extremely poor snowpack and many streams are expected to have flows comparable to the dry years of 1926, 1931, 1934 and 1941.

The British Columbia Water Resources Service reports that April 1 volume streamflow forecasts have been revised slightly upwards as a result of retardation of melt and the above normal precipitation that occurred during April. May 1 forecasts for the spring and summer snowmelt seasons call for above average inflows to the Nechako and Bridge river reservoirs; slightly above average volume flows for Columbia and Fraser river stream gaging stations; slightly below average inflows for Okanogan Lake and Peace River reservoirs and below average volume streamflow for Kootenai river gaging stations.

Snowpack conditions in western Montana improved during April. High elevation snow is near average and remains much better than that at medium and lower elevations. May-September streamflow will be in the 80-90 percent of average range except on the upper Clark and Bitterroot rivers where near average flows are predicted. Power reservoirs will fill. No irrigation water shortages are expected for this area except for possible late season shortages on smaller tributaries.

April precipitation in Washington was generally below normal and streamflow was approximately 50 percent of average. Snow is gone or very deficient at the low and middle elevations. High elevation snow is generally normal.

In general, the May-September forecasts improve from north to south with the best outlook that of near normal runoff from Wenatchee north to the Canadian border including the Okanogan and Kettle drainages. Runoff of the Yakima, Cowlitz and Lewis rivers will range from 56 to 79 percent of average.

All power and irrigation reservoirs are expected to fill. Irrigation water supplies will be adequate except on smaller streams without supplemental reservoir water supply.

In Idaho snowfall and precipitation during April were well below normal. At high elevations in the mountains a few snow courses actually gained in water content over the April 1 measurement. However, even at these sites the actual snowfall was below normal for the month and the major snowmelt did not begin at these altitudes. At the middle and low elevation snow courses the snow has melted.

The area of snow cover at this time for production of streamflow is much smaller than normal. This is a critical point because it results in the river flow falling early in the season.

Soil moisture beneath the snowpack at high elevations has not changed significantly and is near normal. Soils at middle and low elevations dried out considerably during April. This was most unfortunate because rain would have produced excellent runoff had it occurred on these soils early in April.

Streamflow forecasts range from 49 percent of average on the Big Wood river to 92 percent on the Snake at Heise. On the major rivers in Idaho stored water has been used practically all month to make up for the streamflow deficiencies. Continued use of stored water will be necessary. Practically all small rivers and streams in southern Idaho, without adequate storage facilities, face a critical low water supply outlook for the remainder of the season.

If hot and dry conditions similar to last summer should recur, new record low flows will be established in Oregon. Water supplies barely sufficient for this season will be available only to water users served by Owyhee, Unity, Wallowa Lake, Prineville, Gerber, Clear Lake and upper Klamath Lake reservoirs. All other reservoirs contain less water than will be needed to supplement streamflow for a satisfactory season. Except for the Wallowa area in northeastern Oregon, streamflow during the remainder of the irrigation season is expected to be 50 percent of average or less. Currently, reservoir storage is 84 percent of average. If maximum drawdown of reservoirs is made, as seems likely, there will be very little carryover for the 1969 season.

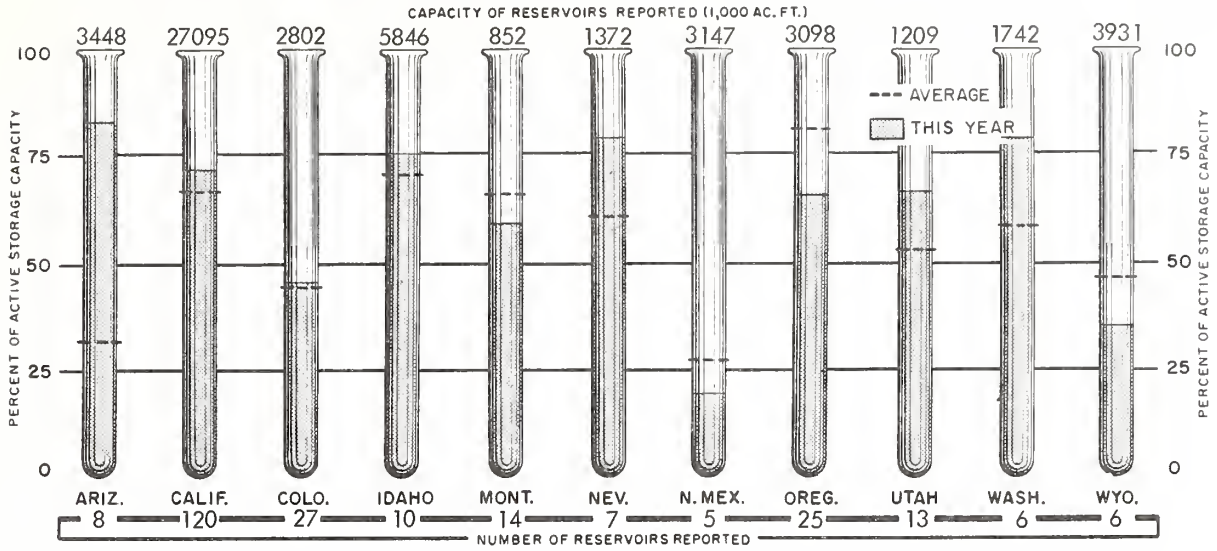
STORAGE IN LARGE RESERVOIRS as of MAY 1, 1968

BASIN AND NAME OF RESERVOIR	CAPACITY (1000 A.F.)	STORAGE (1000 A.F.)
UPPER MISSOURI		
Boysen	550	243
Buffalo Bill	373	68
Canyon Ferry	2043	1345
Hebgen	377	242
Tiber	1316	430
Yellowtail	1356	721
Belle Fourche	185	148
Keyhole	340	119
Fort Peck	19410	16410
Fort Randall	5800	3760
Garrison	24600	18475
Oahe	23600	19776
Big Bend	1900	1731
PLATTE		
Glendo	786	456
Pathfinder	1011	366
Seminoe	982	245
City of Denver (6)	588	430
Colo-Big Thompson (4)	865	449
ARKANSAS		
Conchas	280	171
John Martin	367	0
RIO GRANDE		
Elephant Butte	2207	215
El Vado	194	7
UPPER COLORADO		
Flaming Gorge	3789	2026
Navajo	1709	601
Powell	28040	7459
Blue Mesa	941	336
LOWER COLORADO		
Havusu	619	594
Mead	27207	14780
Mohave	1810	1694
San Carlos	1206	670
Salt River Res. (4)	1755	1725
Verde River Res. (2)	323	309
GREAT BASIN		
Bear	1421	1145
Lahontan	287	252
Rye Patch	172	60
Sevier Bridge	236	109
Strawberry	265	137
Tahoe	732	638
Utah	1149	832

BASIN AND NAME OF RESERVOIR	CAPACITY (1000 A.F.)	STORAGE (1000 A.F.)
UPPER COLUMBIA		
Chelan	676	450
Coeur d'Alene	225	127
Flathead	1791	707
Hungry Horse	3428	2304
Kootenay	673	265
Pend Oreille	1155	931
Roosevelt	5232	284
LOWER COLUMBIA		
Cougar	155	112
Detroit	299	242
Hills Creek	200	148
Lookout Point	337	208
Yakima Res. (5)	1066	923
SNAKE		
American Falls	1700	1672
Arrowrock	287	167
Anderson Ranch	423	312
Brownlee	980	568
Cascade	653	370
Jackson	847	612
Lucky Peak	278	233
Palisades	1200	1021
Owyhee	715	435
PACIFIC COASTAL		
Clair Engle	2448	2105
Clear Lake	440	208
Ross	1202	993
Upper Klamath	584	440
Nacimiento	350	187
CALIFORNIA CENTRAL VALLEY		
Almanor	1036	856
Berryessa	1602	1596
Folsom	1010	684
Isabella	570	224
McClure	1026	656
Millerton	521	280
Oroville	3484	1699
Pine Flat	1013	670
Shasta	4500	3889

Reservoir Storage Data Provided by Bureau of Reclamation, Corps of Engineers, Geological Survey, and water using organizations. Data from California and British Columbia provided by Department of Water Resources and Department of Lands, Forests and Water Resources, respectively.

RESERVOIR STORAGE AS OF MAY 1, 1968



ALASKA

Snow cover in Alaska varies from well above average in the Susitna and Koyukuk basins to considerably below normal in areas such as the Copper river drainage and portions of the Delta watershed. The Chena river drainage area now has a below normal snowpack. Most other areas in the state are near average for May 1.

Snowfall was generally light over most of Alaska during the month of April. However, substantial snowfall amounts were received in the mountains of the southeast panhandle to add to the deficient snowpack in that area. Cool weather has delayed significant snowmelt throughout the state. Soils in the interior are dry and will absorb a substantial portion of the melting snow.

CALIFORNIA

The California Department of Water Resources, coordinating agency for snow surveys in California, reports that a dry season lies ahead for California with spring and summer runoff in all areas forecasted to be below normal. Snowmelt runoff from watersheds in the Sacramento and San Joaquin Valleys is forecasted at 65 and 50 percent of normal, respectively. Thus, streamflow during the 1968 irrigation season, which is well under way, is expected to be one of the 5 lowest experienced during the past 30 years in the Central Valley. Although this spring and summer will be dry, the general water supply situation in most areas is not expected to become critical due to near and above normal storage in surface reservoirs and generally favorable ground water levels.

The northern portion of California, with its greater supply and smaller demands, will have only isolated shortages this season. As in all but the exceptionally good years, shortages can be anticipated in those localized areas where development of conservation storage and ground water basins have not kept pace with growth. In the San Joaquin Valley a more critical condition exists. Here, the U. S. Bureau of Reclamation reports that Class 2 water will not be available this season but it expects that all Class 1 water commitments will be met. Thus, this year water users in much of the San Joaquin Valley will continue near normal operations, supplementing surface supplies by pumping from ground water basins. This supplementary supply, which plays such an important role in the State's economy, is relatively good throughout the State.

In Southern California, local supplies still reflect the benefits from the heavy November precipitation, but subsequent months of below normal precipitation has eroded earlier prospects for a third consecutive year of above normal runoff. Reservoir storage is about 120 percent of average and runoff to date is about 50 percent of normal.

This year, the legendary April showers were limited to but one moderately strong storm that moved rapidly through the State. Total precipitation during the past month was 25 percent of normal, with the northern third of the State averaging about 15 percent and, except for the desert areas, the southern two-thirds about 45 percent of normal. Thus, the season of major precipitation and snow accumulation in California has ended. While it is still possible for rather heavy general storms to materialize, such occurrence is improbable.

May 1 snow surveys of key courses and aerial marker observations indicate that the water content in the State's snowpack is only 45 percent of average for this date. Most low and many middle elevation snow courses are bare. Below normal temperatures during the middle of the month retarded the melt rate of the pack throughout the State. This cooling was of short duration and by the end of the month runoff from the snowpack had retrieved its lost momentum. Snowpack water content on May 1 ranged from a low of 30 percent of average in the San Joaquin Valley watersheds, to a high of 55 percent of average in the North Coastal area.

Runoff during April in California was substantially below average over the entire State. Flow of nonsnowmelt streams during April averaged 45 percent of normal, ranging from 35 percent of normal in the South Coastal area to 50 percent of normal in the San Francisco Bay area. Runoff from streams tributary to the Central Valley averaged slightly over 60 percent of normal for the month. In the San Joaquin Valley, the April runoff for individual river basins ranged from a high of 74 percent of normal for the Stanislaus River Basin to a low of 44 percent of normal for the Tule River Basin. In the Sacramento Valley, runoff from the Mokelumne and Cosumnes River Basins were 67 and 44 percent of normal, respectively, with the remaining drainages about 60 percent of normal.

Water stored in 120 major California reservoirs, with a combined capacity of 27,095,000 acre-feet, was 18,780,000 acre-feet, about 105 percent of normal for May 1. This is 846,000 acre-feet more than was in storage at this time one year ago, when levels in many major reservoirs had been lowered in anticipitation of heavy inflow from the record late season snowpack. Aggregate storage in Sacramento and San Joaquin Valley reservoirs was 100 percent and 110 percent of normal, respectively.

EXPLANATION of STREAMFLOW FORECASTS

All flows are observed flows except as adjusted for: 1/ Change in storage in Hebgen Lake. 2/ Change in storage in Canyon Ferry and Tiber reservoirs. 3/ Change in storage in Gibson Reservoir and measured diversions. 4/ Change in storage in Two Medicine, Four Horns and Lake Francis reservoirs. 5/ Change in storage in Boysen and Buffalo Bill reservoirs.

6/ Change in storage in Boysen, Buffalo Bill, Canyon Ferry, Tiber, and Fort Peck reservoirs. 7/ Plus diversions to Cache la Poudre. 8/ Minus diversions from North Platte, Laramie, and Colorado rivers plus measured diversions above station. 9/ Change in storage in Twin Lakes and Sugar Loaf reservoirs minus diversions from Colorado River.

10/ Change in storage in Rio Grande, Santa Maria, and Continental reservoirs. 11/ Change in storage in Platoro Reservoir. 12/ Change in storage in El Vado Reservoir. 13/ Change in storage in Granby Reservoir plus diversions to Cache la Poudre and through Adams Tunnel. 14/ Changes as indicated in (13) plus Moffatt Tunnel diversion. 15/ Plus diversions to Arkansas River.

16/ Change in storage in Flaming Gorge and Big Sandy reservoirs. 17/ Plus diversion through Duchesne Tunnel. 18/ Change in storage in Scofield Reservoir. 19/ Change in storage in Navajo Reservoir. 20/ (Lee's Ferry) Change in storage in Flaming Gorge, Navajo, Lake Powell, and Big Sandy reservoirs.

21/ Plus Utah Power and Light Company tailrace and Logan, Hyde Park, and Smithfield canals. 22/ (Inflow record computed by U. S. Bureau of Reclamation.) 23/ Plus diversion by Weber-Provo Canal and change in storage in Wanship Reservoir. 24/ Change in storage in Deer Creek Reservoir, minus diversions through Duchesne Tunnel and Weber-Provo Canal, plus diversion through Salt Lake City Aqueduct. 25/ Change of storage in Lake Tahoe and Boca Reservoir. (Forecast by Truckee Basin Committee)

26/ Change in storage in any of these reservoirs above the station: Kootenai Lake, Hungry Horse, Flathead Lake, Pend Oreille Lake, F. D. Roosevelt Lake, Lake Chelan, Coeur d'Alene Lake, Brownlee and Noxon; and pumpage at Roosevelt Lake. 27/ Changes in storage in Coeur d'Alene Lake and diversions by Spokane Valley Farms Company and Rathdrum Prairie canals. 28/ Change in storage in Lake Chelan. 29/ Changes in storage for Jackson Lake and Palisades Reservoir above stations. 30/ Change in storage in Henry's Lake, Island Park and Grassy Lake reservoirs and diversions between Ashton and Rexburg.

31/ Change in storage in Mackay Reservoir, and diversion in Sharp Ditch. 32/ (Combined flow Big Wood River nr. Bellevue and Camas Creek nr. Blaine.) 33/ Change in storage in Arrowrock, Anderson Ranch, and Lucky Peak. 34/ Change in storage in Cascade and Deadwood reservoirs. 35/ Change in storage in Keechelus, Kachess, and Cle Elum reservoirs plus diversion by Kittitas Canal. 36/ (Corrected to natural flow). 37/ Change in storage in Merwin, Yale, and Swift reservoirs. 38/ (Corrected for upstream impairments).

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